

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No: 10/540,606  
Applicants: Toshiaki Takenaka et al.  
Filed: June 27, 2005  
Title: METHOD AND APPARATUS FOR MANUFACTURING CIRCUIT BOARD  
T.C./A.U.: 1792  
Examiner: Brian K. Talbot  
Confirmation No.: 9266  
Docket No.: MAT-8716US

**REPLY TO EXAMINER'S ANSWER**

Commissioner for Patents  
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Claims 1-5, 8-16, 23-25 and 27-35 are pending in the above-referenced application. Claims 6, 7, 17-22 and 26 have been cancelled. Claims 1-5, 8-16, 23-25 and 27-35 have been appealed. The present invention relates to a method and apparatus for manufacturing circuit board used in various electronic devices.

Claims 1-5, 8-16, 23, 24 and 27-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent No. 2001-213064 (hereinafter "Takenaka") in combination with Japanese Patent No. 57-103862 (hereinafter "Kuroki"). Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Takenaka in combination with Kuroki further in combination with Japanese Patent No. 2001-7514 (hereinafter "Kozo").

Takenaka teaches a printing plate and printing method whereby a process comprises passing a squeegee onto an inclined part of a paste removing part provided on a mask before the printing pattern or paste filling. Kuroki teaches a screen printing plate for filling conductor whereby the solid metal screen having a concavo-convex pattern formed at a side where a squeegee starts to move, of a periphery of a pattern of the screen printing plate.

With this reply, Applicants address two contentions made in the Examiner's Answer dated February 18, 2010. In his answer, the Examiner addressed the rejections of claims 1-5, 8-16, 23, 24 and 26-35. Applicants wish to respond to two of the Examiner's assertions from his answer.

#### **"Result Effective Variables"**

The Examiner argues that it would have been obvious for one skilled in the art at the time the invention was made to have modified Takenaka with the depressions evidenced by Kuroki with the expectation of achieving a more complete removal of the excess paste from the squeegee. Importantly, at the top of page 4, the Examiner acknowledges that Takenaka and/or Kuroki **fail to teach masking both sides (as taught in Independent claims 1 and 2), forming the groove (taught in claims 8-11 and 27-30) and the compositional make-up of the substrate having the holes to be filled (taught in claims 13-15 and 32-34).** Although the Examiner acknowledges the references are silent with respect to these features, the Examiner explains that he has taken the position that these features are all "result effective variables" which are within the skill of one practicing in the art. The Examiner further asserts that these features "...would have been an obvious modification of the art absent a showing of unexpected result garnered directly from the claimed limitations."

Applicants respectfully disagree. As defined in the MPEP §2144.05, section II, B a result effective variable is "... a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." Applicants respectfully submit that the three features identified by the Examiner are **NOT** result effective variables under the MPEP definition. These features in no way represent variables, and therefore cannot be determined from a workable range as required by the MPEP definition. Rather, these features are elements that are described in the specification. Further to this argument, the definition for the term "Result Effective Variables" appears in the MPEP under §2144.05 which is entitled "Obviousness of Ranges." Applicants respectfully submit that the features, masking both sides, forming a groove and the compositional makeup of the substrate have nothing to do with number variables or a range of numbers.

Furthermore, the MPEP additionally cites two cases involving Result Effective Variables that have been decided approximately 30 years ago. Both of these cases, *In re Antonie*, 559 F.2d 618 (CCPA 1977) and *In re Boesch*, 617F.2d 272 (CCPA 1980) deal extensively with numerical variables. The *In re Antonie* decision holds that the ratio of tank volume to contractor area for a claimed waste water treatment device is not a Result Effective Variable. The *In re Boesch* decision discussed the use of prior art suggesting proportional balancing to achieve desired results in the formation of an alloy. To show that the prior art suggested this proportional balance, the Court in *In re Boesch* analyzed a series of charts of known prior art to determine that the proportional balancing for the formation of the alloy was shown by the prior art. Three of the actual tables used are reproduced below:

Heat No.	C	Cr	Ni	Co	Fe	Mo	Ti	Al	B	N v
D1-379-1	0.01	15.3	Bal.	17.9		4.5	3.6	4.7	0.023	2.53
D1-379-2	0.04	15.3	Bal.	17.9		4.6	3.6	4.7	0.022	2.54
D1-380-1	0.06	15.3	Bal.	17.5	1.0	4.6	3.6	4.7	0.021	2.51
D1-380-2	0.06	15.1	Bal.	17.4	3.5	4.5	3.5	4.6	0.020	2.40
D1-382	0.06	15.3	Bal.	18.5		4.3	3.5	4.4	0.019	2.47
D1-383	0.06	15.2	Bal.	17.7		4.3	3.6	4.4	0.020	2.43
D1-386	0.06	15.3	Bal.	18.1		4.7	3.4	4.6	0.021	2.49

Table 1 - Chemistry-Weight Procedure

Alloy No.	Sample Removed After (Hours)	Measured Creep (inches per inch)
2-1422	1567.8	.0008
2-1423	1500.4	0.004
2-1425	1504.5	0.010
2-1426	1500.4	0.004
6-3211	1505.1	0.034

Table 5 - Various Creep Tests

Alloy No.	C	Al	Ti	Mo	Cr	Co	B	Ni	N v Value
2-1422	0.07	4.20	3.23	4.70	14.7	18.0	0.030	bal.	2.32
2-1423	0.06	4.37	3.45	4.45	14.6	17.6	0.028	bal.	2.36
2-1425	0.06	3.91	2.98	4.40	14.8	17.5	0.028	bal.	2.21
2-1426	0.05	4.20	3.19	4.50	14.5	17.5	0.030	bal.	2.27
6-3211	0.06	4.43	3.54	4.95	15.2	18.8	0.030	bal.	2.51

The Composition and N v values of the Alloy Heats from Table V above.

Accordingly for at least the reasons stated above, Applicants respectfully submit that the Examiner has improperly characterized the three elements that are missing from Takenaka and Kuroki as result effective variables. Furthermore, because the Examiner freely admits that Takenaka and Kuroki fail to include these features, Applicants respectfully submit that independent claims 1 and 2 are patentable. Claims 3-5, 7-16, 23, 24 and 26-35 are patentable by virtue of their dependency on allowable independent claims 1 or 2.

### **Showing of Criticality**

The Examiner also asserts that no showing has been supplied to support that the shape of the hole cleaning part, the method of producing the hole cleaning part or the substrate to which the paste is supplied has any criticality to producing the expected result, i.e. cleaning paste material from the squeegee as it passes. Upon such a showing, the Examiner asserts that he will reconsider his position.

In the Background Art section, starting on page 1 and continuing to page 4 the Applicants have expressly laid out the problems of cleaning the paste in the prior art. Furthermore, being on page 9, line 25 the Applicants describe the importance of their new method:

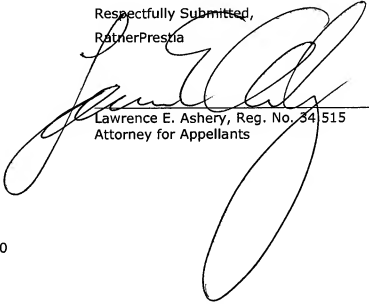
At a position of an unnecessary part of a product area or an outside of the product area of a paste-filling area of a mask film and within a printing range, linear or hound's-tooth no-penetrated-holes or hound's-tooth through-holes, whose surroundings are swollen by using a laser processing method, or a squeegee cleaning part, which is formed of a linear or hound's-tooth no-penetrated groove by using a cutting edge, is formed. After that, the mask film having the paste filling area and an opposite mask film are bonded to both sides of a substrate, so that a through-hole is formed and then paste is filled

Applicants respectfully submit that this quote captures a desirable result obtained for an exemplary embodiment of Appellants' claimed invention. Accordingly, Applicants respectfully submit that claims 1-5, 8-16, 23, 24 and 26-35 are allowable for at least the reasons discussed above.

**Conclusion**

In view of the arguments set forth above, reversal of the rejection of the claims of the above-identified application is respectfully requested.

Respectfully Submitted,  
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